Report: DOE/ER/40246-19

NEUTRON SCATTERING STUDIES

Final Report

May 2004 – April 2007

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This report covers the period from May 2004 to April 2007. It is also the Final Report for grant DE-FG02-86ER 40246. During this period one graduate student received his Ph.D. degree. An abstract of his dissertation is attached.

The report includes a summary of graduate degrees conferred upon students active in our group and publications by our group.

Graduate degree conferred.

Mr. Carlos Roldan has successfully defended his Ph.D. dissertation and has received his Ph.D. degree at the June 2006 commencement. A copy of his dissertation abstract is attached.

Summary: Graduate Students Supported.

The following students have received their Ph. D. degrees while supported totally or partially by DOE contract or grant funds.

Jessy H. Dave, 1980
Desmond W. Chan, 1981
Christopher A. Ciarcia, 1983
Ji Qun Shao, 1984
Joseph P. Ring, 1985
Ganesh C. Goswami, 1986
Gerald D. Brady, Jr., 1986
Daryush Ila, 1987
Abobakr Aliyar, 1988
Chandrika Narayan, 1992
Christopher Horton, 1992
Causon Jen, 1992
Ramakrishnan Venugopal, 1992
Gang Yue, 1993
Wen-Liang W. Chang, 1993
Parrish Staples, 1993
Diane Case, 1994
David DeSimone, 1995
Jinhua Chen, 1996

Michael, O'Connor,1996

Mitchell Woodring, 1997

Young June Ko, 1999

Pil-Neyo Seo, 2001

Don-Soo Kim, 2002

Kalong Ouyasathian, 2003

Carlos Roldan, 2006

Chuncheng Ji, expected for 2007

Afrim Alimeti., expected for 2007.

There were 10 M.S. recipients who receiver their degrees while supported by DOE grant or contract funds.

Summary: Publications of this group.

During the period of this report there were 54 papers published in refereed scientific magazines. 71 oral presentations were made at professional meetings; abstracts of these presentations were published. 21 papers were presented orally at international meetings in Antwerp, Gatlinburg, Julich, Mito, Santa Fe (2), Trieste, and Tsukuba; the text of these presentations was published in the Conference Proceedings.

Attachment: Abstract of the Ph.D. dissertation by Carlos Roldan.

THE ANGULAR DISTRIBUTION OF NEUTRONS OBTAINED BY IRRADIATING A THICK LITHIUM TARGET WITH PROTONS

BY
CARLOS F. ROLDAN

ABSTRACT OF A DISSERTATION SUBMITTED TO THE FACULTY OF THE
DEPARTMENT OF PHYSICS AND APPLIED PHYSICS
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN PHYSICS (RADIOLOGICAL SCIENCES OPTION)
UNIVERSITY OF MASSACHUSETTS LOWELL
2006

Dissertation Supervisor: Gunter H.R. Kegel,Ph.D.
Professor of Physics, Department of Physics and Applied Physics
University of Massachusetts Lowell

ABSTRACT

There is considerable interest in neutron irradiations with neutron energies in the zero-to-several MeV range. Neutrons need not be monoenergetic, in fact, usually they are not, but a fairly accurate knowledge of the energy spectrum is required. The absence of unwanted radiation, such as thermal neutrons or gamma rays, is desirable.

At the University of Massachusetts Lowell Radiation Laboratory the $^{7}Li(p,n)^{7}Be$ reaction was used to generate fast neutron fluences from a thick lithium target. A computer code, MURI, was written to determine the neutron energy spectrum so that prospective users could avail themselves of this information. The validation of MURI has been undertaken by several workers in the Radiation Laboratory, notably by David DeSimone. The present work covers measurements of the angular distribution of the neutron fluence. The selection of a neutron detector and its calibration is described. The experimental set up, the results of measurements, conclusions and recommendations for future action are reported.